The PSU Museum: Interpretation of peninsular Thailand's nature

YINGYOD LAPWONG

Abstract

The PSU Museum, officially named the Princess Maha Chakri Sirindhorn Natural History Museum is part of the Prince of Songkla University in Southern Thailand. The history of the museum's collections is briefly documented. They originally developed to support the university's teaching programs in the biological sciences, but have undergone rapid growth in recent years in support of biodiversity research in the region. The scope of the museum's collections and associated outreach and educational programs are outlined. Administrative arrangements for the museum are analyzed. It is argued that professional museum staff members are required to augment the scientific expertise of the museum.

History

Most of biological collections in universities are generally responsive to teaching activities in their biological departments (KRISHTALKA & HUMPHREY 2000). Accordingly, the Department of Biology, Faculty of Science, Prince of Songkla University (PSU) has established biological collections of plants and animals to support its teaching programs. These collections have been giving students opportunities to learn by handing real objects, and, thus, providing a more effective object-based pedagogy. Moreover, biological collections provide resources not only for principle biology but also for taxonomy, systematics, and other branches of biological science (LANE 1996). Currently, PSU students from nine faculties, in Hat Yai campus, relating to natural and health sciences have to take at least one biological subject as part of their degree programs. The number of these students accounts for more than half of all students in campus. So, the biological collections of the department have continuously grown in order to support teaching activities of the growing university. In addition, there is a collection of rocks and minerals which was donated by the Department of Mining Engineering, Faculty of Engineering. In 1994, all biological collections and the geological collection was eventually merged and established in the Faculty of Science as the Natural History Museum of Prince of Songkla University (PSU Museum). Later on 14 January 2008, it was renamed the Princess Maha Chakri Sirindhorn Natural History Museum.

Although the biological collections were primarily used as teaching materials, the current main objective is actually to be reference collections in support of research activities at the Department of Biology and the Centre of Biodiversity of Peninsular Thailand (CBIPT), Faculty of Science, PSU. These three organizations – the museum, the department and CBIPT – collaborate in many research projects. Amongst these projects is the Plant Genetic Conservation Project under the Royal Initiative of HRH Princess Maha Chakri Sirindhorn. While many university museums are facing financial problems due to the research bias towards molecular biology (GROPP 2003), the biological science collections of the Department of Biology have fortunately continued to expand, because of the department's emphasis on biodiversity research, which benefits greatly from the existence of the biological reference collections (PONDER ET AL. 2001). The collections of particular organisms have, therefore, been expanded due to these research activities.

The plant collection, which later became the herbarium, was established in 1970 as a result of the Plant Taxonomy subject. In 1975, Professor Jack Cannon from Western Australia University visited PSU, and studied on flora of Southern Thailand. Then, he deposited voucher specimens from his research to the herbarium. Since 1978, the herbarium has gradually continued to increase in size, thanks to the financial aid of the World Bank and the pioneer contribution from the late Professor

Kasin Suvatabhandhu of Chulalongkorn University. Also, Gordon Congdon and Clement Hamilton from Harvard University had volunteered in the herbarium between 1978 and 1979. With the assistance of James F. Maxwell who joined the herbarium between 1984 and 1986, the herbarium reached the milestone of 7,000 specimens and was registered an international herbarium in 1987 as the PSU Herbarium. Then, further specimens of higher plants, fungi, lichens and seaweeds were registered in the collections during 1990s and 2000s, adding the number of specimens up to over 25,000. The PSU Herbarium was one of the very first registered international herbaria in Thailand, along with the Forest Herbarium (BKF) and the Bangkok Herbarium (BK). These three herbaria are part of the Plant Genetic Conservation Project. At present, the PSU Herbarium is curated by Assoc. Prof. Dr Kitichate Sridith, who succeeded the retired Prof. Puangpen Sirirugsa in 1999 (SATASOOK & LHEKNIM 2008).

The current faunal collections were also established as a result of teaching activities and research. Since the Department of Biology was founded, there have been excursions to collect faunal specimens every year as part of most zoological courses. As a center of biodiversity studies in Southern Thailand, many research projects also added up the number of specimens. In addition, local people and institutes have donated or sold some specimens to the museum, so that they will be on display to the public. However, unlike the floral collection, each faunal collection had been developed independently, causing the collections to be heterogeneous. The variation of the collections is limited by specializations of the department's lecturers and researchers. As a result, only particular groups of fauna are focused, whereas some others are poorly studied and collected.

Administration

In the beginning, as part of the Faculty of Science, the Princess Maha Chakri Sirindhorn Natural History Museum was reported to the dean of the Faculty. In early 2010, it became an independent unit of the university. This situation is uncommon for most university museums which usually are operated under jurisdiction of the departments. Still, at the moment, all activities are to be inspected and assisted by the Faculty of Science. The museum is currently directed by Assoc. Prof. Dr Chutamas Satasook, Dean of PSU Faculty of Science.

The Princess Maha Chakri Sirindhorn Natural History Museum is one of very few active natural history museums in Thai universities. Most university museums only function as exhibition and storage areas, overseen by departmental lecturers. They are only opened for visitors on special occasions. Additionally, active collections used in research usually belong to academic departments, without registration in forms of museum collections or database. By contrast, there are seven full-time members of staff working in the museum. However, due to the administration system of the university, there is no official position of curator or manager at present. The museum plans to recruit six more posts by 2013. Volunteering is not common for most museums in Thailand, although it usually plays a significant role in several activities at the museums. Realizing such an importance, the museum regularly conducts volunteer programs. There are both paid and unpaid volunteers, the majority of which is from the Faculty of Science. Local residents and high-school students also join the programs. It is possible for the volunteers to work in both reference collection and exhibition sections. Those who work in the reference collection are supervised by researchers with specialized knowledge of each collection. They mainly work on specimen preparation and putting data into database. Those who work in the exhibition sections are trained to have enough knowledge concerning the exhibition contents and skills to present them efficiently. The main responsibility of these volunteers is to guide visitors through the museum’s exhibitions, especially in some special occasion, such as Thailand's National Science Week organized yearly by the Faculty of Science in August. Previously, the first and the second batches of volunteers were instructed by staff members from the National Science

Museum. However, the museum has recently trained the volunteers itself based on instructions of the National Science Museum and with the aid of volunteers from previous batches.

The museum's governing committee comprises two groups of members, namely 'researchers' and 'support officers and technicians'. Most of them are from the Department of Biology and CBIPT in the Faculty of Science. As there is no full-time curator at the moment, the collections have been cared for by the researchers from nine research units within CBIPT that, albeit an independent entity, collaborates with the museum. These nine units are:

- Seaweed and Seagrass Research Unit
- Plankton Research Unit
- Coral Reef and Benthos Research Unit
- Bat and Barn Owl Research Unit
- Insect Research Unit
- Flora Research Unit
- Paleobotany Research Unit
- Cephalopod Research Unit
- Amphibians and Reptiles Research Unit

The research conducted by these units are likely to focus on the biodiversity of all ecosystems in upper Malay Peninsula, even though CBIPT scope of study covers all parts of Thailand and her neighboring countries.

Financially, the museum has been supported by the Office of the Higher Education, Faculty of Science, PSU and the royal Plant Genetic Conservation Project. The admission fee and souvenir sales do not contribute significant income to the museum. The fee itself is low, and the museum does not have a museum shop. Souvenirs are available from the administration office. However, the museum is developing the membership program and the friends of museum program which encourage people and companies to support the museum.

The Princess Maha Chakri Sirindhorn Natural History Museum has collaborated with several institutes, both domestic and international, aiming to exchange knowledge and professionals in research and education. The domestic institutes include some universities in Thailand, Ministry of Natural Resources and Environment, and the National Science Museum. The international institutes collaborating with the museums comprise several universities in Europe and Asia, the Royal Belgium Institute of Natural Science, the Kew Botanic Garden (in London), the Harrison Institute, the Raffle Museum, the Field Museum (in Chicago), and the Hungarian Natural History Museum.

Collections

The Princess Maha Chakri Sirindhorn Natural History Museum houses more than 50,000 specimens of over 6,000 species of organisms – including plants, animals, fungi and protists – more than 70% of which are from Southern Thailand. The collections are mostly the results of teaching and research activities. Nevertheless, some collections have been developed and improved as a result of workshops held by the museum or the department. There are few numbers of purchased and donated specimens.

The PSU Herbarium has documented more than 25,000 specimens of about 1,500 species of plants. Furthermore, there is a small collection of fungi and lichens deposited in the herbarium. Most of the plant specimens, especially higher plants, are conserved in the form of herbarium sheets. Fungi and lichens were air-dried and placed in envelopes. These dry specimens are grouped in families and stored in cabinets in a temperature-controlled room to avoid humidity and germs. However, some

specimens are preserved in alcohol to aid research. There are five type specimens of higher plants and one type specimen of fungi kept in this collection (XU & BURTT 1991; CHANTARANOTHAI & PARNELL 1993; SRIDITH 1999; PETCHARAT 2003; MAKNOI & JENITTIKUL 2006).

The Seaweed and Seagrass Research Unit is responsible for caring the collection of seaweeds. This collection preserves 142 from 326 algal species in Thailand (COPPEJANS ET AL. 2010), making it a very comprehensive collection of this kind. Additionally, there is a small collection of fossils, consisting of 178 specimens of unidentified plant species.

There are estimated 25,000 specimens of 4,500 faunal species in the museum. The fauna collection has a considerable number of invertebrate specimens due to their abundance in nature. Also, more than half of zoological researchers in the department work on invertebrate zoology. Some significant faunal collections include corals, crustaceans, planktons, molluscs, insects, fishes and bats. The coral collection has 200 of the 428 coral species found in Thai waters (SPALDING ET AL. 2001). They have previously been cleaned and preserved as dry specimens. Their exoskeletons are stored in plastic boxes to protect them from dust and physical damage. Most of these specimens have been collected from southern Thailand by CBIPT researchers.

The crustacean collection is significant as it contains five type specimens (ANGSUPANICH 2001; ANGSUPANICH 2004; LEELAWATHANAGOON ET AL. 2005; LEELAWATHANAGOON ET AL. 2010). The collection owns more than 1,000 specimens of over 400 crustacean species, most of which are preserved in formalin, before being transferred to alcohol. Formalin was widely used as preservative solution, because of its great fixative ability. However, due to strong health concerns, upcoming specimens will be fixed with formalin before transferred to preserve in alcohol to reduce toxicity.

The crustacean collection overlaps with the plankton collection because some plankton species are crustaceans. However, they are administered by two different research units. There are 67 specimens of 37 zooplankton species kept as wet specimens and mounted slides; mostly rotifers and cladocerans. Two of these specimens are type specimens of a rotifer (CHITTAPUN ET AL. 2003). None of phytoplankton is registered.

The mollusc collection includes 3,300 specimens of over 80 species. Most bivalves and gastropods are kept as shells. A sub-collection of about 2,000 formalin-preserved cephalopod specimens has been developed recently. However, they are currently being identified.

The insect collection is the largest zoological collection in the museum in terms of the number of species. There are approximately 2,000 species of insect preserved as pinned specimens. Insect identification is still problematic, due to a very large number of species and specimens found. As such, the final count of the quantity was still incomplete. In this collection, there is an attractive sub-collection of butterflies. This sub-collection is considered one of the largest in Thailand with 12,000 specimens of 850 species, accounting for 67% of the 1,291 species found in Thailand (EK-AMNUAY 2007). In addition to invertebrate collections, there is a small collection of echinoderms.

Although another majority of invertebrates is worm phyla, especially annelids, the collections of these fauna have not been developed yet. The teaching samples of worm phyla are collected every year but they could not be registered to a collection, as they require special methods of collection and preservation.

Fishes are the major component of the vertebrate collections, with more than 3,000 specimens preserved in formalin. Froese and Pauly (2011) assert that 2,191 species of fish, both native and introduced, are found in Thailand. The PSU Museum houses about 40% of these known species, i.e. more than 880. Another comprehensive vertebrate collection is the bat collection. Although there are

268 species of mammals in Thailand, almost half are bats with 119 confirmed species (BUMRUNGSRI ET AL. 2006). This faunal collection of the museum contains 84% of bat species in Thailand. The number of specimens in this collection reaches 1,600 of 100 species. In fact, this collection includes several unpublished new species and new records in Thailand. In terms of preservation, some specimens are in alcohol and some specimens are stored in the form of skulls or skins. This collection is the only collection which preserves tissue for molecular genetics purposes. Other than fishes and bats, the museum houses a small number of other vertebrates, including amphibians, reptiles, birds and small mammals. Lastly, several animal fossils are also present in the collection.

Collection	**Number of specimens**	**Number of species**	**Number of species found in Thailand**	**% of species found in Thailand**
Coral	Counting	200	428[1]	44%
Crustacean[2]	2,000	400	n/a	n/a
Plankton[2]	67	37	n/a	n/a
Mollusc	3,300	Identifying	n/a	n/a
Bivalve & Gastropod	1,300	400	n/a	n/a
Cephalopod	2,000	Identifying	n/a	n/a
Insect	Counting	2,000	n/a	n/a
Butterfly	12,000	850	1,291[3]	67%
Echinoderm	200	50	381[4]	13%
Fish	3,000	880	2,191[5]	40%
Amphibian	426	35	141[6]	25%
Reptile	120	53	325[7]	16%
Bat	700	100	119[8]	84%
Plant	25,000	1,500	15,000[9]	10%
Algae	2,000	142	326[10]	43%
Fossil	203	Identifying	n/a	n/a
Plant fossil	178	Identifying	n/a	n/a
Animal fossil	25	Identifying	n/a	n/a
Total	**50,000**	**6,000**		

Table 1 - The approximate number of specimens and species in some collections in the Princess Maha Chakri Sirindhorn Natural History Museum in comparison to the diversity of fauna and flora in Thailand (as of 2010).

Unfortunately, the museum lacks for a professional taxidermist. There are a few taxidermic specimens on display, but none of them has been registered in any collection. Furthermore, the donated rocks and minerals, both on-display and in-store, have yet to be registered. Gemstones are not currently exhibited due to the limitation of security system. It is, therefore, essential for the museum to establish more collaborations with other institutes, such as the Department of Mining Engineering, Faculty of Engineering. Moreover, anthropological collection and exhibition should be developed to encourage learning on other natural history topics. It is suggested that the museum should recruit a museologist

[1] SPALDING ET AL. 2001.
[2] The species of crustacean and plankton are overlap.
[3] EK-AMNUAY 2007.
[4] PUTCHAKARN & SONCHAENG 2004.
[5] FROESE & PAULY 2011.
[6] CHAN–ARD 2003.
[7] NABHITABHATA ET AL. 2000.
[8] BUMRUNGSRI ET AL. 2006.
[9] OFFICE OF ENVIROMENTAL POLICY AND PLANNING (OEPP)1992.
[10] COPPEJANS ET AL. 2010.

who is independent from research activities to act as a collection manager. Hopefully, the policy to get more staffs would fill these gaps.

Exhibitions and outreach

The museum occupies a three-storied building in the PSU Hat Yai campus, to house its permanent exhibitions. The exhibition area is divided into four main sections, entitled (1) *Origin of Earth and the Geological Time Scale*, (2) *Temporary Exhibitions*, (3) *Diversity of Life*, and (4) *Ecosystems*. All exhibitions focus more on peninsular Thailand. There are several techniques of display. The *Origin of Earth*, the *Geography of Thailand*, and the *200 years of Darwin* are displayed as poster-based exhibitions. The *Rocks and Minerals*, the *Fossils*, and the *Diversity of Life* display real objects. In some cases, models are preferable for safety and convenience. For example, fish models are used, since most fish specimens are preserved in hazardous formalin. The *Amazing Nature*, which is a temporary exhibition, employs interactive displays to attract audiences' attention and interest. Similar to many museums, dioramas are set in the exhibition area to show objects in simulated environment, as found in the *Carboniferous Forest* and the *Ecosystems*. Since the opening in 2008, the museum has welcomed more than 40,000 visitors each year.

The museum also provides several outreach and educational programs, including youth camps, workshops, volunteering, research support opportunities, and other special events. Every year, the museum organizes at least one youth camp for students from the local area to develop their interest in conservation through activities in the camps. Occasionally, the museum hosts workshops, particularly on taxonomy and conservation. Moreover, students from PSU, local schools, and local residents can also join the museum as volunteers. However, unlike western countries, the museum does not have any retired professor volunteering. Besides, students and researchers from around the world are also able to access to the collections, and use them as a resource for their study and research. The museum also aims at acting as the community center for the learning of natural history. There are some events, such as the National Children Day and the National Science Week, which allow free admission to the museum. There are some activities that aim to assert indirectly the importance of science and biology, including science shows, games, and competitions. Recently, the museum together with the municipality and local schools has established a program promoting the protection of the woodland behind PSU. It is expected that this will be a tool for natural study for locals, especially those in younger generations.

Issues for consideration

The museum also has several problems, one critical of which concerns the database. The museum does not have a universal database, because each of its collections has been established and cared for by different research units. So, the types of data set are unmatched. The museum has begun to develop a self-written database software for all collections, but this will take time to complete. Despite the attempt to create such a universal database, the process is very slow, because of the large number of specimens, both registered and registration-awaiting. Another reason that slows the progress in completing the database is the different data sets that require amalgamation that will still allow for the development of further research. For example, the bat database requires a data set of bat vocalizations, whereas the plankton database requires a data set of electron microscope photography. In this case, an additional professional collection manager may help create a system and integrate all databases together.

Another problem is the lack of knowledge about museum organization. This hinders the organization from functioning as a whole. Most of the personnel involved in this museum are from scientific backgrounds. This is beneficial to the museums in terms of collection maintenance. However,

management and other relevant aesthetic issues regarding displays are poorly developed. Some exhibitions contain very competent content, but fail to attract audiences, while some are too difficult for children – the majority of visitors – to follow. Some specimens on display are vulnerable because of unsuitable environments, such as too strong light or too high temperature. Knowledge of marketing and public relations is also needed. The museum still depends upon government support, because it could not be operated merely by its current level of self-generated income. At present, because of university policy, it is not likely that the museum will be able to recruit a collection manager. As mentioned before, few museums in Thai universities are administrated as an independent unit. So, the Office of the Higher Education does not have any measure to support university museums. Therefore, such positions as curators or collection managers do not exist in the university's administration structure. Unless this policy can be reversed, then training existing personnel on museum management and other relevant issues is essential for long-term development of a sustainable museum. Thus, the museum needs to encourage the university to consider about this issue.

Acknowledgements

Many thanks are dued to Dr Andrew Simpson and all lecturers in the Museum Studies Program, Macquarie University for advice; and to all staff member at the Princess Maha Chakri Sirindhorn Natural History Museum for provisions. Special thanks to Mr Chirabodee Tejasen for comments on the language use.

Literature cited

ANGSUPANICH, S. 2001. A new species of Pagurapseudopsis (Tanaidacea, Pagurapseudidae) from Songkhla Lake, Thailand. *Crustaceana* 74 (9): 871–882.

ANGSUPANICH, S. 2004. A new species of Longiflagrum (Tanaidacea, Parapseudidae), from Songkhla Lagoon, Thailand. *Crustaceana* 77 (7): 849–860.

BUMRUNGSRI, S., D. L. HARRISON, C. SATASOOK, A. PRAJUKJITR, S. THONG-AREE & P. J. J. BATES. 2006. A review of bat research in Thailand with eight new species records for the country. *Acta Chiropterologica* 8 (2): 325–359.

CHAN–ARD, T. 2003. *Amphibians in Thailand*. Bangkok: Dan Suttha Printing Co., Ltd. [in Thai].

CHANTARANOTHAI, P. & J. PARNELL 1993. New taxa and combinations in Cleistocalyx and Syzygium (Myrtaceae) in Thailand. *Kew Bulletin* 48 (3): 589–610.

CHITTAPUN, S., P. PHOLPUNTHIN & H. SEGERS 2003. Contribution to the knowledge of Thai microfauna diversity: notes on rare peat swamp Rotifera, with the description of a new Lecane Nitzsch, 1872. *Hydrobiologia* 501: 7–12.

COPPEJANS, E., A. PRATHEP, F. LELIAERT, K. LEWMANOMONT & O. DE CLERCK 2010. *Seaweeds of Mu Ko Tha Lae Tai (SE Thailand) Methodologies and field guide to the dominant species*. Bangkok: Biodiversity Research and Training Program (BRT).

EK-AMNUAY, P. 2007. *Butterflies of Thailand. Fascinating insects.* Vol. 2. (1st edition). Bangkok: Amarin Printing and Publishing Public Co., Ltd. [in Thai].

FROESE, R. & D. PAULY (eds.) 2011. *FishBase.* www.fishbase.org (accessed September 14, 2011).

GROPP, R. E. 2003. Are university natural science collections going extinct? *BioScience* 53 (6): 550.

KRISHTALKA, L. & P. S. HUMPHREY 2000. Can natural history museums capture the future? *BioScience* 50: 611–617.

LANE, M. A. 1996. Roles of natural history collections. *Annals of the Missouri Botanical Garden* 83 (4): 536–545.

LEELAWATHANAGOON, P., V. LHEKNIM & P. K. L. NG 2005. On a new species of freshwater crab of the genus Johora (Brachyura, Potamidae) from peninsular Thailand. Crustaceana 78 (1): 59–66.

LEELAWATHANAGOON, P., V. LHEKNIM & P. K. L. NG 2010. On a new species of freshwater crab of the genus Terrapotamon (Brachyura, Potamidae) from peninsular Thailand. *Crustaceana* 81 (1): 49–59.

MAKNOI, C. & T. JENITTIKUL 2006. A new species of Curcuma L. (Zingiberaceae) from Southeast Asia. *Gardens' Bulletin Singapore* 58 (1): 41–45.

NABHITABHATA, J., T. CHAN–ARD & Y. CHUAYNKERN 2000. *Checklist of Amphibians and Reptiles in Thailand.* Bangkok: Office of Environmental Policy and Planning (OEPP).

OFFICE OF ENVIRONMENTAL POLICY AND PLANNING (OEPP) 1992. *Thailand Country Study on Biodiversity.* Bangkok: Ministry of Science, Technology and Environment.

PETCHARAT, V. 2003. Edible Astraeus (Basidiomycota) from Thailand. *Nordic Journal of Botany* 23 (4): 499–503.

PONDER, W. F., G. A. CARTER, P. FLEMONS & R. R. CHAPMAN 2001. Evaluation of museum collection data for use in biodiversity assessment. *Conservation Biology* 5 (3): 648–657.

PUTCHAKARN, S. & P. SONCHAENG 2004. Echinoderm fauna of Thailand: History and inventory reviews. *ScienceAsia* 30: 417–428.

SATASOOK, C. & V. LHEKNIM (eds.) 2008. *Princess Maha Chakri Sirindhorn Natural History Museum.* Hatyai: Faculty of Science Press, Prince of Songkla University [in Thai].

SPALDING, M. D., C. RAVILIOUS & E. P. GREEN 2001. World Atlas of Coral Reefs. Prepared at the UNEP World Conservation Monitoring Centre. Berkeley: University of California Press.

SRIDITH, K. 1999. Argostemma fasiculata (Rubiaceae), a new species from Cambodia. *Nordic Journal of Botany* 23 (2): 169–171.

XU, Z. R. & B. L. BURTT 1991. Towards a revision of Paraboea (Gesneriaceae): I. *Edinburgh Journal of Botany* 48 (1): 1–18.

Contact

Yingyod Lapwong
Princess Maha Chakri Sirindhorn Natural History Museum, Prince of Songkla University, Hatyai, Thailand
Master student, Macquarie University, Museum Studies Program
Address: Macquarie University 2109 NSW, Australia
E-mail: psu.museum(at)yahoo.com
www.nhm.psu.ac.th/museum_en/